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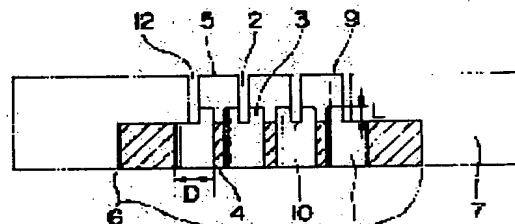
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) BASE FOR MOLDING HONEYCOMB

)Abstract:

RPOSE: To mold a channel structure for obtaining a homogeneous
lded form having less distortion.

INSTITUTION: A base for molding a honeycomb comprises a plurality of
haust channels 2 made of latticelike grooves, and a plurality of feed
annels 1 connected to the channels 2 to split supply paste, wherein the
ste supplied from an upstream end 4 is molded in a continued latticelike
lded form and exhausted from a downstream end 5. The channels 1 are
ended to the upstream ends of the channels 2, and reservoirs 3 having a
annel sectional area larger than the channels 1 are provided at the upper
eam ends. Accordingly, excellent mechanical processability and
ensional accuracy can be provided.



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AIMS

aim(s)]

aim 1] In a mouthpiece the object for honeycomb shaping which is equipped with two or more outflow ways which consist of a grid-like slot, and two or more feeding passage which is connected to each outflow way and carries out the supply of the paste, and fabricates this paste in the shape of [continuous] a grid -- the object for honeycomb shaping characterized by having made the upper edge of each outflow way extend each feeding passage, and abolishing the reservoir which has the larger passage cross section than each feeding passage in each upper edge -- a mouthpiece.

aim 2] the object for honeycomb shaping according to claim 1 -- the object for honeycomb shaping to which each feeding passage is extended by die-length L at the upper edge of each outflow way in a mouthpiece while it is formed in the shape of [which has a diameter D] a hollow cylinder, and, as for a reservoir, the ratio of said die-length L and said diameter D is characterized by being formed by $0.1 < \text{ratio-of-length-to-diameter} < 1$ -- a mouthpiece.

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DETAILED DESCRIPTION

Detailed Description of the Invention]

[001]

Industrial Application] the suitable object for honeycomb shaping for this invention to relate to the mouthpiece which carries out extrusion molding of the ceramics or the catalyst to the shape of a honeycomb, excel in dimensional accuracy, and prevent a check -- it is related with a mouthpiece.

[002]

Description of the Prior Art] the conventional object for honeycomb shaping -- a mouthpiece -- setting -- the paste of a material -- the object for honeycomb shaping -- honeycomb shaping of the ceramics or a catalyst is performed by extruding from a mouthpiece (mouthpiece). As shown in drawing 8 - drawing 11, a common mouthpiece consists of two or more passage, and is divided into the two-layer passage of the flow direction of a paste. Two-layer passage connects the paste which was prepared in the upstream of a mouthpiece 6 and was supplied from the extruder which is illustrated to the down-stream end face 10 of two or more feeding passage 1 which carries out division feeding, and feeding passage 1 in each passage, is established in the downstream of a mouthpiece 6, and is formed of two or more flow ways 2 which fabricate the paste sent in from the feeding passage 1 in the shape of a grid (the shape of a honeycomb). At the time of extrusion molding, in order to form the outermost periphery rib 12 of a honeycomb, an outer frame 7 is fitted in and used for a mouthpiece 6.

[003] Subsequently, the unit passage of a mouthpiece is shown in drawing 12, and the function of each part is explained. As for a mouthpiece, two or more these unit passage is connected with juxtaposition. At the time of extrusion molding, once the paste supplied to the upper edge 4 of a mouthpiece 6 is divided, flows in each feeding passage 1, and passes the inside of the hollow cylinder. The paste which passed through the feeding passage 1 flows into the outflow way 2 which makes the slot of the cruciform section combined with the down-stream end face 10 of the feeding passage. Since the passage cross section S_0 of the feeding passage 1 and passage cross-section S_+ of the outflow way 2 have a relation of $S_0 > S_+$ in the boundary section of the feeding passage 1 and the outflow way 2, the paste which flowed to the cross-joint slit spreads toward the lateral passage sticking-by-pressure side 8 to a passage shaft. For this reason, paste is mutually stuck by pressure in respect of [8] unification sticking by pressure of a cross-joint Plastic solid, while passing a cross-joint slit, and at the down-stream edge of a mouthpiece 6, a honeycomb cell is fabricated continuously.

[004] In order to promote sticking by pressure in the passage sticking-by-pressure side 8 of a mouthpiece 6, as shown drawing 13, there are some which were made to carry out crossover duplication with the outflow way 2 by the longitudinal direction of the feeder current way 1, turned to the downstream, tapered off and set this duplication section structure 11a. This mouthpiece 6 is supposed that the grid-like honeycomb which a paste becomes easy to flow in a longitudinal direction, the outlet, i.e., the duplication section, of the feeder current way 1, and does not have a defect is obtained. Moreover, when machining a mouthpiece 6, it is common that carry out hole down processing of the feeding passage 1 with a drill from the upper edge 4 of a mouthpiece 6, and a grinding stone performs slot end processing of the outflow way 2 in the shape of a grid first from the location which the feeding passage 1 subsequently processed from the opposite side extends. Since the mouthpiece processed by this approach is unsuitable, the point angle, i.e., the tapering structure, of a drill, even if it is easy to produce weld flash in the contact and intersection of the hole of feeding passage, and the slot of an outflow way and carries out trimming, the difference of delicate surface roughness may be generated in each passage.

[005]

Problem(s) to be Solved by the Invention] the conventional object for honeycomb shaping -- the mouthpiece with which both machinability at the time of manufacturing a mouthpiece and honeycomb moldability of a mouthpiece were

bled although the paste could be fabricated in the shape of a honeycomb if it was in the mouthpiece -- the consideration as proper structure is not made. That is, since the reservoir is not enough, poor sticking by pressure and rate-of-flow difference between each passage occur in the location which a paste moves to an outflow way from a feeder current way, and the problem which paste back pressure reduces is in it. Moreover, in order to carry out hole processing of the feeding passage with a drill from an upper edge when machining a mouthpiece, and for a grinding stone to, perform slot end processing of an outflow way from an opposite side subsequently to the shape of a die, even if it carries out trimming, the difference of surface roughness occurs in each passage, a flow resistance difference is produced in each passage, and there are a piece at the time of the deflection of a Plastic solid or shaping a problem which leads to the crack at the time of desiccation if it lengthens.

[06] the object for honeycomb shaping which the purpose of this invention has the passage structure where a homogeneous Plastic solid with few strains can be acquired, and was excellent in machinability -- it is in offering a mouthpiece.

[07] means for Solving the Problem] the object for honeycomb shaping which starts this invention in order to attain the aforementioned purpose -- a mouthpiece In a mouthpiece the object for honeycomb shaping which is equipped with two or more outflow ways which consist of a grid-like slot, and two or more feeding passage which is connected to each outflow way and carries out division supply of the paste, and fabricates a paste in the shape of [continuous] a grid -- the upper edge of each outflow way is made to extend each feeding passage, and it considers as the configuration which established the reservoir which has the larger passage cross section than each feeding passage in each upper edge. [08] And each feeding passage may be extended by die-length L at the upper edge of each outflow way while it is formed in the shape of [which has a diameter D] a hollow cylinder, and the configuration that the ratio of die-length L and a diameter D is formed by $0.1 < \text{ratio-of-length-to-diameter} < 1$ is sufficient as a reservoir.

[09] function] According to this invention, the paste by which division supply was carried out in feeding passage flows in an outflow way which makes grids structure via the reservoir which extended feeding passage and was formed in the upper edge of an outflow way. the section (die length) of the direction of extrusion predetermined more greatly [this reservoir / the passage cross section] than feeding passage and -- it is -- etc. -- since it is prepared as cross-section passage, the role of a reservoir of the paste distributed to an outflow way is played, and the function to send out a paste in a longitudinal direction and the outflow way of the downstream by the almost equal pressure is given. consequently, the difference in the pressure drawdown between each feeding passage eases -- having -- a mouthpiece -- the velocity distribution of an outlet also tends to become uniform, and the residual stress in a Plastic solid is also reduced, and it leads to preventing the strain and crack at the time of desiccation baking.

[10] moreover, the thing for which a feeder current way inside is smoothed by reaming where generating of return by machining was prevented by the connection of a feeder current way and an outflow way and generating of return is suppressed by extending feeding passage and establishing a reservoir in the upper step of an outflow way -- a mouthpiece -- equalization of the velocity distribution of an outlet is attained. Also when it tapers off to the downstream the feeder current way which furthermore carried out crossover duplication with the outflow way and a taper is formed, the same effectiveness is acquired fundamentally. further -- the ratio of die-length L of a reservoir, and the diameter D of a feeder current way -- $0.1 < \text{ratio of length to diameter}$ Since it is formed by < 1 , it is hard to produce shaping strain and causing breakage and deformation of a mouthpiece is lost.

[11] example] One example of this invention is explained referring to drawing 1 - drawing 3 . Two or more outflow ways 2 which consist of a grid-like slot as shown in drawing 1 - drawing 3 , It has two or more feeding passage 1 which is connected to each outflow way 2 and carries out division supply of the paste. It is a mouthpiece. the object for honeycomb shaping which fabricates the paste supplied from the upper edge 4 in the shape of [continuous] a grid, and discharges a Plastic solid from the down-stream edge 5 -- The upper edge of each outflow way 2 is made to extend each feeding passage 1, and it considers as the configuration which established the reservoir 3 which has the larger passage cross section than each feeding passage 1 in each upper edge. And each feeding passage 1 is extended by die-length L at the upper edge of each outflow way 2 while it is formed in the shape of [which has a diameter D] a hollow cylinder. That is, the down-stream end face 9 of each feeding passage 1 shall be extended from the upper end face 10 of each outflow way 2 by the downstream by die-length L between the down-stream end face 9 and the upper end face 10, and the reservoir 3 shall be formed so that the ratio of die-length L and a diameter D may be set to $0.1 < \text{ratio-of-length-to-diameter} < 1$. In addition, at the time of extrusion molding, in order to form the outermost periphery rib 12 of a honeycomb, it is used for a mouthpiece (for honeycomb shaping mouthpiece) 6 by the outer frame 7, fitting into it.

12] Actuation of this example is explained using drawing 1 - drawing 4 . It flows in the outflow way 2 which consists of a grid-like slot via the reservoir 3 which the paste by which division supply was carried out extended the low cylinder-like feeding passage 1 to the downstream, and was formed in the feeding passage 1. Since the passage cross section is greatly prepared in the direction of extrusion of a paste as cross-sections [section / (die length) / determined] passage rather than the feeding passage 1 as A line of drawing 4 shows this reservoir 3, the function to send out a paste to a longitudinal direction and the outflow way of the downstream by the almost equal pressure is enhanced. consequently, the difference in the pressure drawdown between each feeding passage eases -- having -- a mouthpiece -- the velocity distribution of the paste in an outlet also tends to become uniform, and the residual stress in a plastic solid can also be reduced, and it leads also to preventing the strain and crack at the time of desiccation baking. In addition, the example of the others mentioned later which shows B line of drawing 4 to drawing 5 - drawing 7 , the conventional example which shows C line to drawing 8 - drawing 10 , and the D line express change of each passage cross section to the passage location of the conventional example shown in drawing 13 .

13] According to this example, machinability also serves as dominance extremely. That is, generating of return of machining in the intersection of a feeder current way and an outflow way can be prevented by extending feeding passage and establishing a reservoir in the upper edge of an outflow way. moreover, the condition of having suppressed generating of return in this example although the level difference arose between the apical surface of the hole of a feeder current way, and the slot of an outflow way and generating of return was made promoting by the connection of a feeder current way and an outflow way with the conventional structure when it was going to ream the feeder current way -- a feeder current way inside -- reaming -- smooth -- it can carry out -- a mouthpiece -- equalization of the velocity distribution in an outlet can be attained.

14] there is the same effectiveness as the example which also shows the configuration which tapered off at the tip of downstream of the feeder current way 1 extended at the upper edge of the outflow way 2, and formed the taper 11 fundamentally to drawing 1 - drawing 4 so that drawing 5 - drawing 6 may be boiled and shown as other examples of invention. That is, since the tapering taper 11 can be appropriately chosen according to the point angle of a drill, generating of return is prevented.

15] The point of this example is to establish a bigger reservoir than the passage cross section of feeding passage in upper edge of an outflow way, it is not generated by the die length of arbitration and the effectiveness of die-length of a reservoir 3 demonstrates the greatest effectiveness in a certain range. That is, die-length L cannot discover the equalization effectiveness of short ** past ** and a paste, either, but the shear rate by deformation of a paste becomes large in a narrow field, and it is easy to leave a shaping strain. It stops moreover, also discovering the effectiveness of return prevention at the time of machining. On the contrary, the reinforcement of the pin-like projection with which die-length L is formed between outflow ways may fall, and a mouthpiece long beyond the need may cause breakage and formation of a mouthpiece. The suitable die-length L dimension in consideration of these things is expressed with (1) e.

16]

-- < -- ratio of length to diameter < 1 (1)

re, it is the diameter of feeding passage. : The die length of D reservoir : In order to check the effectiveness of L (example) this example, the mouthpiece of the following dimension configuration was made as an experiment with the structure shown in drawing 5 - drawing 7 .

17]

pitch : 3.3mm rib thickness : The die length of the diameter [of D:2.6mm] phi feeding passage of 0.4mm feeding passage : 14.5mm outflow way : 5.0mm -- a mouthpiece -- thickness : Die-length [of 19.0mm reservoir] L : number of 0.5mm cels 47 cels (appearance 155.7mmx155.7mm) feeder current way is with a drill and a parallel reamer, and the outflow way was processed with BN (boron nitride) grinding stone. The inside granularity of the obtained passage is as follows.

18] Hole of feeding passage : Slot of 3-micrometer or less outflow way : 0.2 micrometers, using this mouthpiece and new extruder, TiO₂ system powder / glass fiber / methyl cellulose / water was kneaded with the kneader, and was extricated with a denitrification catalyst paste. Consequently, the Plastic solid also with good sticking by pressure between cels which does not have deflection at the compacting pressure of P= 45-50kg/cm², the rate of flow V= 200 - 300 mm/min was acquired. Moreover, this Plastic solid was able to be dried under 85 degree-Cx70% conditions, and the highly desiccation object without a crack was able to obtain.

19] (Example of a comparison) In order to compare with an example, the mouthpiece of the following dimension configuration was made as an experiment with the structure shown in drawing 8 as an example of a comparison.

20]

pitch : 3.3mm rib thickness : The die length of the diameter [of D:2.6mm] phi Feeder current way of 0.4mm feeding
 sage : 14.0mm outflow way : 5.0mm -- a mouthpiece -- thickness : The die length of 19.0mm reservoir : 47xnumber
 0mm cels 47 cels (appearance 155.7mmx155.7mm)
 for the outflow way, the feeder current way processed only drill (it exchanges for every 200 hole processing)
 cessing with BN grinding stone. The inside granularity of the obtained passage is as follows.

[21]
 le of a feeder current way : Slot of 8-20-micrometer outflow way : 0.2 micrometers of TiO₂ system denitrification
 alyst pastes of the same presentation as an example and the same lot were fabricated using this mouthpiece and screw
 ruder. Consequently, compared with an example, a pressure is high and the rate of flow is slow at the compacting
 ssure of $P = 50-55 \text{ kg/cm}^2$, the rate of flow $V = 150 - 200 \text{ mm/min}$. Moreover, the Plastic solid bent to the one
 ection, and when this deflection rotated the mouthpiece, it has been concluded that it was a thing resulting from the
 ifiguration of a mouthpiece from the place which the direction of deflection also changes according to it. Moreover,
 a result of drying this Plastic solid under 85 degree-Cx70% conditions, when deflection was restrained, the
 rsversal crack entered with the part as the starting point which the strain of tension produced.

[22] It is considered to be the causes that these phenomena have the coarse front face of a feeder current way and that
 reservoir does not exist in the upper edge of the feeding passage of a paste.

[23]
 ffect of the Invention] According to this invention, since the reservoir of a paste was established in the upper edge of
 ding passage, since machinability is excellent, dimensional accuracy improves, and shaping processing speed
 comes large with low voltage, and there is effectiveness which can fabricate a homogeneous Plastic solid with few
 ains.

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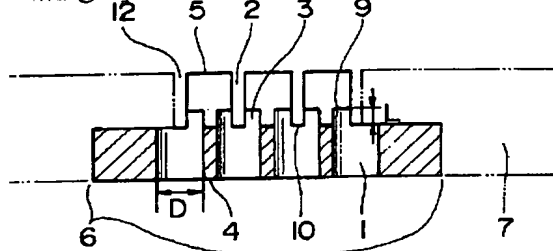
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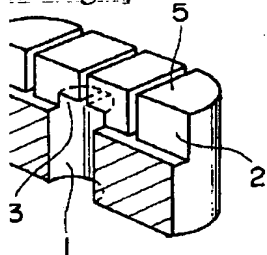
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DRAWINGS

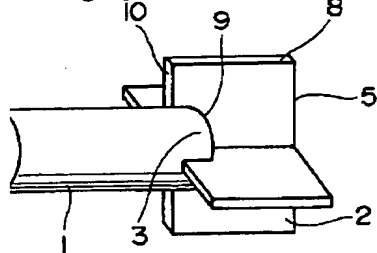
Drawing 1]



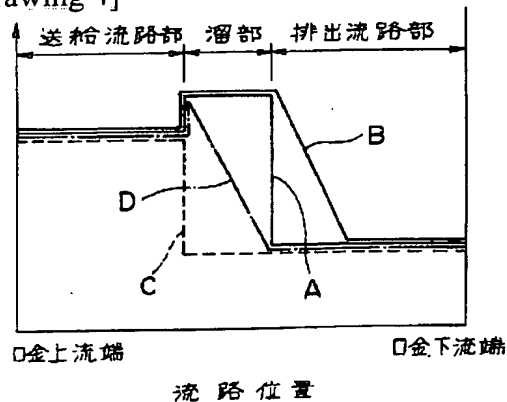
Drawing 2]



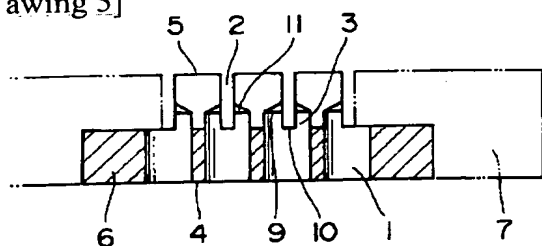
Drawing 3]



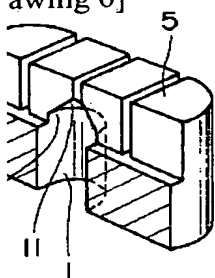
Drawing 4]



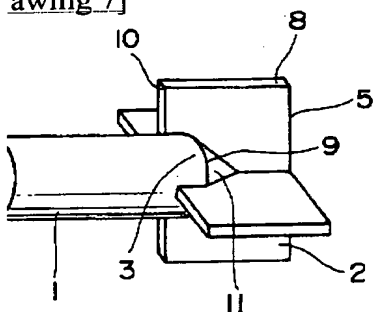
rawing 5]



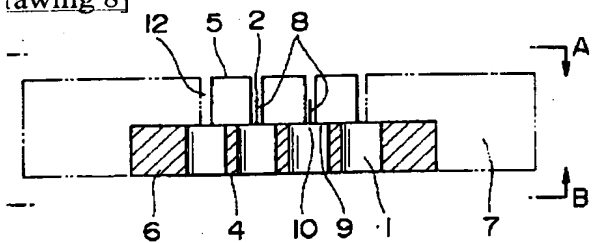
rawing 6]



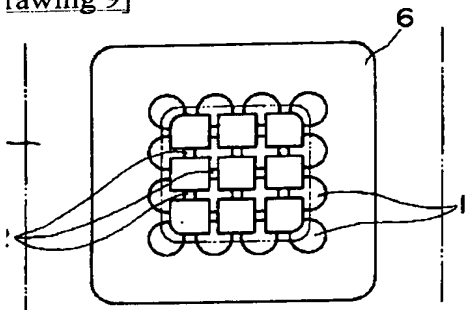
rawing 7]



rawing 8]



rawing 9]



rawing 10]

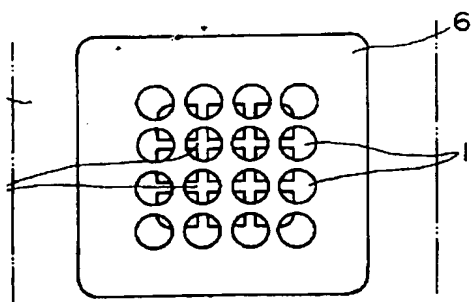


Figure 11]

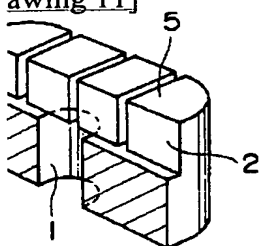


Figure 12]

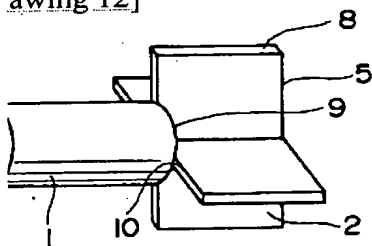
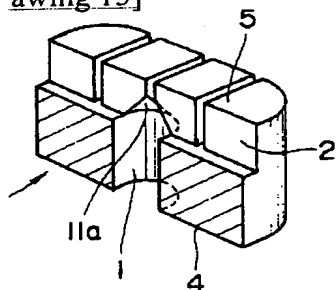


Figure 13]



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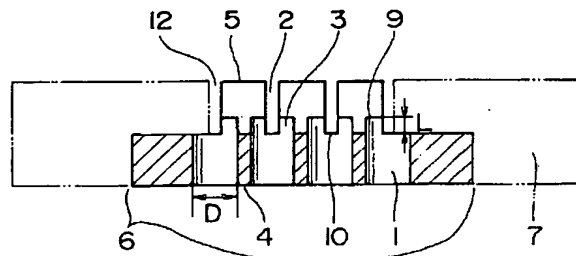
(54)【発明の名称】 ハニカム成形用口金

(57)【要約】

【目的】 ひずみの少ない均質な成形体を得る流路構造を形成可能とする。

【構成】 格子状の溝よりなる複数の排出流路2と、それぞれの排出流路2に接続してペーストを分割供給する複数の送給流路1とを備え、上流端4より供給されたペーストを連続した格子状に成形体に成形し下流端5より排出するハニカム成形用口金であって、それぞれの送給流路1をそれぞれの排出流路2の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路1より大きい流路断面積を有する溜部3を設けた。

【効果】 機械加工性と寸法精度とに優れる。



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【特許請求の範囲】

【請求項1】 格子状の溝よりなる複数の排出流路と、それぞれの排出流路に接続されペーストを分割供給する複数の送給流路とを備え、該ペーストを連続した格子状に成形するハニカム成形用口金において、それぞれの送給流路をそれぞれの排出流路の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路より大きい流路断面積を有する溜部を設けたことを特徴とするハニカム成形用口金。

【請求項2】 請求項1記載のハニカム成形用口金において、それぞれの送給流路は、直径Dを有する中空円柱状に形成されるとともにそれぞれの排出流路の上流端部に長さLで延長され、溜部は、前記長さLと前記直径Dとの比が $0.1 < L/D < 1$ で形成されていることを特徴とするハニカム成形用口金。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、セラミックスや触媒をハニカム状に押し出し成形する口金に係り、特に寸法精度に優れかつ乾燥割れを防止するのに好適なハニカム成形用口金に関する。

【0002】

【従来の技術】 従来のハニカム成形用口金においては、原料のペーストをハニカム成形用口金（口金）より押出すことにより、セラミックスや触媒のハニカム成形を行っている。一般的な口金は、図8～図11に示すように、複数の流路よりなり、ペーストの流れ方向の2層の流路に分けられる。2層の流路は、口金6の上流側に設けられ、図示しない押出機より供給されたペーストを個々の流路に分割送給する複数の送給流路1と、送給流路1の下流端面10に接続して口金6の下流側に設けられ、送給流路1より送り込まれたペーストを格子状（ハニカム状）に成形する複数の排出流路2とにより形成される。押出成形時には、ハニカムの最外周リブ12を形成するため、口金6に外枠7を嵌合して使用する。

【0003】 次いで図12に口金の単位流路を示し、各部の機能を説明する。口金はこの単位流路が複数個並列に連結されたものである。押出成形時には、口金6の上流端4に供給されたペーストは、一旦、分割され個々の送給流路1内に流入してその中空円柱の内面を通過する。送給流路1を通過したペーストは、送給流路1の下流端面10に結合されている十字断面の溝をなす排出流路2へ流入する。送給流路1と排出流路2との境界部において送給流路1の流路断面積S0と排出流路2の流路断面積S+とは、 $S0 > S+$ の関係にあるため、十字スリットに流入したペーストは、流路軸に対して横方向の流路圧着面8に向かって広がる。このため、ペーストは、十字スリットを通過する間に十字成形体の合流圧着面8で互いに圧着し、口金6の下流端ではハニカムセルが連続して成形される。

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【0004】 口金6の流路圧着面8における圧着を促進させるため、図13に示すように、供給流路1の長手方向で排出流路2と交差重複させ、この重複部を下流側に向けて先細り構造11aにしたものがある。この口金6は、供給流路1の出口すなわち重複部でペーストが横方向に流れ易くなり、欠陥のない格子状ハニカムが得られるとされている。また、口金6を機械加工する場合、まず口金6の上流端4よりドリルによって送給流路1を穴明け加工し、次いで反対面より、加工した送給流路1の延長する位置より砥石によって格子状に排出流路2の溝切り加工を行うのが一般的である。この方法で加工した口金は、ドリルの先端角つまり先細り構造が不適当なため、送給流路の穴と排出流路の溝との接点や交差部でバリが生じ易く、バリ取りをしても各流路に微妙な表面粗さの差を発生することがある。

【0005】

【発明が解決しようとする課題】 従来のハニカム成形用口金にあっては、ペーストをハニカム状に成形することはできるが、口金を製作する際の機械加工性及び口金のハニカム成形性の両者を合わせた口金適正構造としての配慮がなされていない。すなわち、ペーストが供給流路より排出流路に移動する位置に溜部が十分でないため、圧着不良や各流路間の流速差が発生し、ペースト背圧が低減する問題がある。また、口金を機械加工する場合、上流端よりドリルにより送給流路を穴明け加工し、次いで反対面より砥石によって格子状に排出流路の溝切り加工を行うため、バリ取りをしても各流路に表面粗さの差が発生し、個々の流路で流動抵抗差を生じ、成形体の曲がりや成形時の切れ、引いては乾燥時の割れにつながる問題がある。

【0006】 本発明の目的は、ひずみの少ない均質な成形体を得ることのできる流路構造を有し、かつ機械加工性に優れたハニカム成形用口金を提供することにある。

【0007】

【課題を解決するための手段】 前記の目的を達成するため、本発明に係るハニカム成形用口金は、格子状の溝よりなる複数の排出流路と、それぞれの排出流路に接続されペーストを分割供給する複数の送給流路とを備え、ペーストを連続した格子状に成形するハニカム成形用口金において、それぞれの送給流路をそれぞれの排出流路の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路より大きい流路断面積を有する溜部を設けた構成とする。

【0008】 そしてそれぞれの送給流路は、直径Dを有する中空円柱状に形成されるとともにそれぞれの排出流路の上流端部に長さLで延長され、溜部は、長さLと直径Dとの比が $0.1 < L/D < 1$ で形成されている構成でもよい。

【0009】

【作用】 本発明によれば、送給流路に分割供給されたペ

ーストは、送給流路を延長して排出流路の上流端部に形成された溜部を経由し、格子構造をなす排出流路内に流入する。この溜部は、送給流路よりも流路断面積が大きく、かつ押出方向の所定の区間（長さ）で等断面積流路として設けられているため、排出流路に分配されるペーストの溜めの役割を果たし、ペーストを横方向と下流側の排出流路とにほぼ均等な圧力で送り出す機能が付与される。その結果、個々の送給流路間における圧力降下の差異が緩和され、口金出口の流速分布も均一となり易く、また成形体中の残留応力も低減され、乾燥焼成時におけるひずみや割れを防ぐことにつながる。

【0010】また送給流路を延長して排出流路の上流端部に溜部を設けることにより、供給流路と排出流路との接続部で機械加工による返りの発生が防止され、返りの発生を抑えた状態で供給流路内面をリーマ加工により滑らかにすることにより、口金出口の流速分布の均一化を図られる。さらに排出流路と交差重複した供給流路の下流側に先細りテーパを設けた場合も基本的に同様の効果が得られる。さらに溜部の長さ L と供給流路の直径 D との比が $0.1 < L/D < 1$ で形成されているため、成形ひずみが生じ難く、口金の破損や変形を引き起こすことがなくなる。

【0011】

【実施例】本発明の一実施例を図1～図3を参照しながら説明する。図1～図3に示すように、格子状の溝よりなる複数の排出流路2と、それぞれの排出流路2に接続されてペーストを分割供給する複数の送給流路1とを備え、上流端4より供給されたペーストを連続した格子状に成形し成形体を下流端5より排出するハニカム成形用口金であって、それぞれの送給流路1をそれぞれの排出流路2の上流端部に延長させ、それぞれの上流端部にそれぞれの送給流路1より大きい流路断面積を有する溜部3を設けた構成とする。そして、それぞれの送給流路1は、直径 D を有する中空円柱状に形成されるとともにそれぞれの排出流路2の上流端部に長さ L で延長され、つまりそれぞれの送給流路1の下流端面9がそれぞれの排出流路2の上流端面10より下流側に、下流端面9と上流端面10との間の長さ L で延長され、溜部3は、長さ L と直径 D との比が $0.1 < L/D < 1$ になるように形成されているものとする。なお押出成形時は、ハニカムの最外周リブ12を形成するため、口金（ハニカム成形用口金）6に外枠7が嵌合して使用される。

【0012】本実施例の動作を図1～図4を用いて説明する。送給流路1に分割供給されたペーストは、中空円柱状の送給流路1を下流側に延長して形成した溜部3を経由し格子状の溝よりなる排出流路2内に流入する。この溜部3は、図4のA線で示すように、送給流路1よりも流路断面積が大きく、かつペーストの押出方向に所定の区間（長さ）を等断面積流路として設けられているため、ペーストを横方向と下流側の排出流路にほぼ均等な

圧力で送り出す機能が付与される。その結果、個々の送給流路間における圧力降下の差異が緩和され、口金出口におけるペーストの流速分布も均一となり易く、また成形体中の残留応力も低減でき、乾燥焼成時のひずみや割れを防ぐことにもつながる。なお図4のB線は図5～図7に示す後述する他の実施例、C線は図8～図10に示す従来例、またD線は図13に示す従来例の流路位置に対する各流路断面積の変化を表している。

【0013】本実施例によれば、機械加工性も極めて優位となる。すなわち、送給流路を延長して排出流路の上流端部に溜部を設けることにより、供給流路と排出流路との交差部における機械加工の返りの発生が防止できる。また従来の構造では供給流路をリーマ仕上げしようとする、供給流路の穴の先端面と排出流路の溝との間に段差が生じ、供給流路と排出流路との接続部で返りの発生を助長させていたが、本実施例では、返りの発生を抑えた状態で供給流路内面をリーマ加工により滑らかにすることができ、口金出口での流速分布の均一化を図ることができる。

【0014】本発明の他の実施例として図5～図6に示すように、排出流路2の上流端部に延長した供給流路1の下流側の先端に先細りテーパ11を設けた構成も基本的に図1～図4に示す実施例と同様の効果がある。すなわち先細りテーパ11をドリルの先端角に応じて適切に選択できるため、返りの発生が防止される。

【0015】本実施例のポイントは、排出流路の上流端部に、送給流路の流路断面積よりも大きな溜部を設けることにあり、溜部3の長さ L の効果は、任意の長さで生じるものではなく、ある範囲で最大の効果を発揮する。すなわち、長さ L が短か過ぎるとペーストの均圧効果も発現できず、狭い領域でペーストの変形によるせん断速度が大きくなり、成形ひずみを残し易い。また機械加工時の返り防止の効果も発現しなくなる。逆に、長さ L が必要以上に長い口金は、排出流路間に形成されるピン状突起物の強度が低下し、口金の破損や変形を引き起こすことがある。これらのことを考慮した適切な長さ L 寸法は、(1)式で表される。

【0016】

$$0.1 < L/D < 1 \quad \dots (1)$$

ここで、送給流路の直径 : D
溜部の長さ : L

（実施例）本実施例の効果を確認するため、図5～図7に示す構造で次の寸法形状の口金を試作した。

【0017】

セルピッチ : 3.3 mm
リブ厚 : 0.4 mm
送給流路の直径 D : 2.6 mm ϕ
送給流路の長さ : 14.5 mm
排出流路 : 5.0 mm
口金厚さ : 19.0 mm

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溜部の長さL : 0.5mm

セル数47×47セル(外形155.7mm×155.7mm)

供給流路はドリルと平行リーマとで、排出流路はBN(ボロンナイトライド)砥石で加工した。得られた流路の内面粗さは次の通りである。

【0018】供給流路の穴部 : 3μm以下

排出流路の溝部 : 0.2μm

この口金とスクリー押出機とを用いて、TiO₂系粉末/ガラス繊維/メチルセルロース/水をニードにより混練し脱硝触媒ペーストにより成形した。その結果、成形圧力P=45~50kg/cm²、流速V=200~250mm/minで曲がりのないセル相互の圧着も良好な成形体が得られた。また、この成形体を85℃×70%の条件下で乾燥し、割れない健全な乾燥体を得ることができた。

【0019】(比較例)実施例と比較するため、比較例として図8に示す構造で次の寸法形状の口金を試作した。

【0020】

セルピッチ : 3.3mm

リップ厚 : 0.4mm

供給流路の直径D : 2.6mmφ

供給流路の長さ : 14.0mm

排出流路 : 5.0mm

口金厚さ : 19.0mm

溜部の長さ : 0mm

セル数47×47セル(外形155.7mm×155.7mm)

供給流路はドリル(200穴加工ごとに交換)加工のみ、排出流路はBN砥石で加工した。得られた流路の内面粗さは次の通りである。

【0021】

供給流路の穴部 : 8~20μm

排出流路の溝部 : 0.2μm

この口金とスクリー押出機とを用いて、実施例と同一組成、同一ロットのTiO₂系脱硝触媒ペーストを成形した。その結果、成形圧力P=50~55kg/cm²、流

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速V=150~200mm/minで実施例と比べて、圧力が高く流速が遅い。また成形体が一方に曲がり、この曲がり口金を回転させるとそれに応じて曲がりの方向も変わるところから、口金の形状に起因するものと断定できた。また、この成形体を85℃×70%の条件下で乾燥した結果、曲がりを拘束した時に引張りのひずみが生じた部分を起点に横割れが入った。

【0022】これらの現象は、供給流路の表面が粗いことと、ペーストの供給流路の上流端部に溜部が存在しないことが原因と考えられる。

【0023】

【発明の効果】本発明によれば、供給流路の上流端部にペーストの溜部を設けたため、機械加工性が優れるため寸法精度が向上し、かつ低圧で成形処理速度が大きくなり、ひずみの少ない均質な成形体を成形することができる効果がある。

【図面の簡単な説明】

【図1】本発明の一実施例を示す断面図である。

【図2】図1の斜視図である。

【図3】図1の単一流路を示す斜視図である。

【図4】本実施例と従来技術の流路断面積の比較を示す図である。

【図5】本発明の他の実施例を示す断面図である。

【図6】図5の斜視図である。

【図7】図5の単一流路を示す斜視図である。

【図8】従来の技術を示す断面図である。

【図9】図8のA、A矢視線を示す平面図である。

【図10】図8のB、B線矢視を示す平面図である。

【図11】図8の斜視図である。

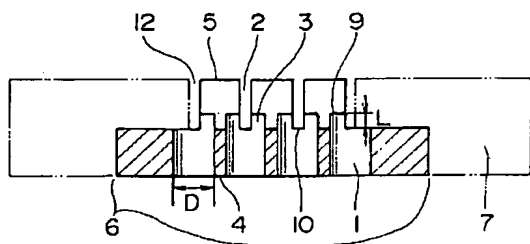
【図12】図1の単一流路を示す斜視図である。

【図13】従来の他の技術を示す斜視図である。

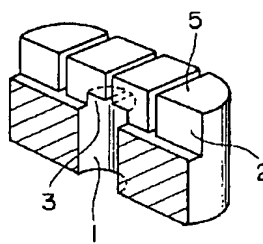
【符号の説明】

- 1 供給流路
- 2 排出流路
- 3 溜部
- 4 上流端
- 5 下流端
- 6 口金

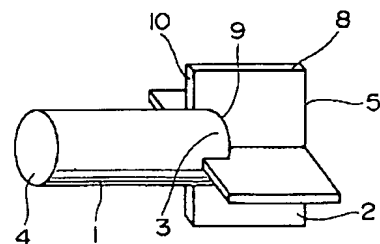
【図1】



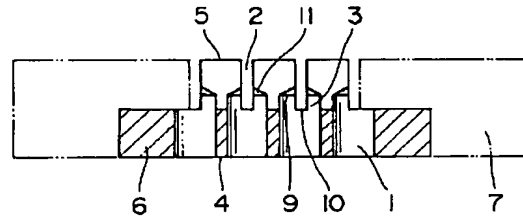
【図2】



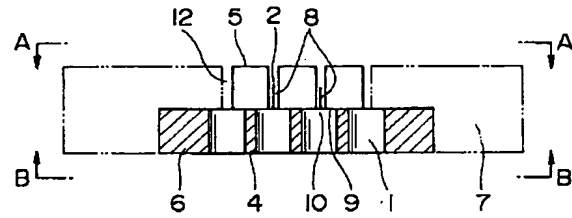
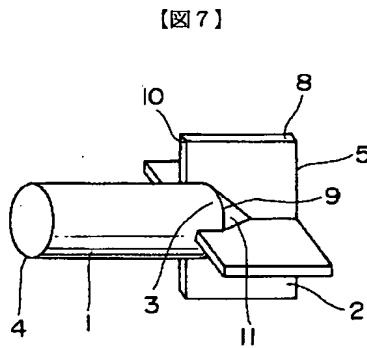
【図3】



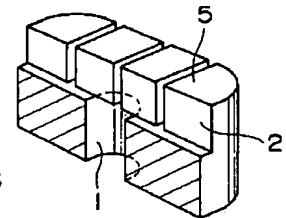
【図 5】



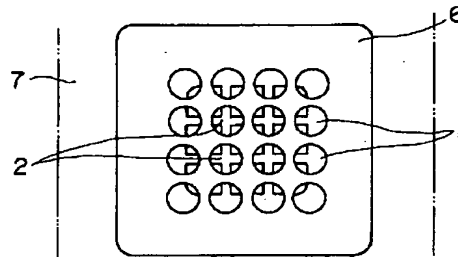
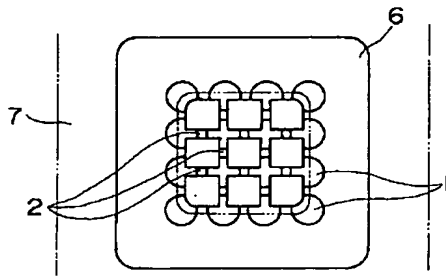
【図 8】



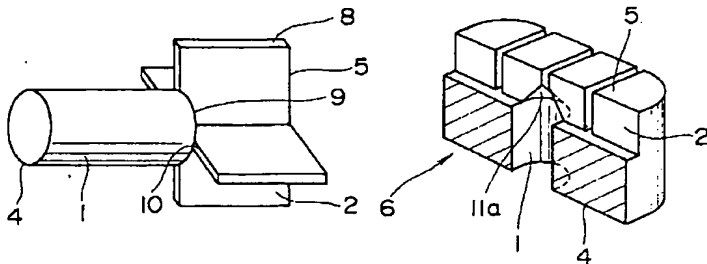
【例 1 1】



【図 10】



【図 13】



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